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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/687,495	10/13/2000	Sean Timothy Crowley	45475-0001999-58164	9398

7590

05/03/2002

Stanley R. Moore, Esq.
Jenkins and Gilchrist, P.C.
3200 Fountain Place
1445 Ross Ave.
Dallas, TX 75202

EXAMINER

GEYER, SCOTT B

ART UNIT

PAPER NUMBER

2829

DATE MAILED: 05/03/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/687,495

Applicant(s)

CROWLEY ET AL.

Examiner

Scott Geyer

Art Unit

2829

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 22 February 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) 1,4-7,13,14,17-23 and 25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1,4-7,13,14,17-23 and 25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on 13 October 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 13
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Drawings

1. The previous notice of acceptable drawings is withdrawn.

The drawings are objected to because of minor informalities. See attached form PTO-948 for necessary corrections. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

2. The specification has been checked to the extent necessary to determine the presence of all possible minor errors. However, the applicant's cooperation is requested in correcting any errors of which applicant may become aware of in the specification.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

4. The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily

published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

5. Claims 1, 4, 6, 7, 13, 14, 17-23 and 25 are rejected under 35 U.S.C. 102(e) as being anticipated by Glenn (6,143,981).

As to **independent claim 1**, Glenn teaches a semiconductor chip with a plurality of input/output pads (figure 8, numeral 56a), a chip paddle (24) which is adjacent a bottom surface of the chip (56) and a plurality of inner leads (53) which surround the chip paddle. The chip paddle and the leads are in a common plane. Conductive wires (58) are used to electrically attach the chip to the leads. A package body is formed by encapsulating with resin (40) the chip paddle, chip, leads and bonding wires, while leaving the lower surface of the leads and the chip paddle exposed. The chip paddle can be in at least one part thicker than a portion of the leads forming the paddle and leads with an encapsulation-locking feature as taught by Glenn in figures 3-6.

As to **claim 4**, Glenn teaches the chip paddle (figure 8, numeral 24) and a lower surface of the leads (53) are in a common plane. Glenn further teaches features of the chip paddle and the leads in which portions of the chip paddle are thicker than portions of the leads (see figures 3-6).

As to **claim 6**, Glenn teaches etching as a means to form the roughened texture of the leads and the chip paddle (figures 3-5) that face the chip paddle in the completed package (column 5, lines 31-67, continued to column 6, lines 1 et seq.).

As to **claim 7**, Glenn teaches exposure of the leads at side surfaces (figure 8, numeral 55) and bottom surfaces (32).

As to **independent claim 13**, Glenn teaches a chip paddle (figure 8, numeral 24) which is attached to a chip (56). The chip paddle has an upper surface (25) a lower surface (26) and an intermediate surface (see figure 6). A plurality of leads (figure 8, numeral 53) surround the chip paddle, and the leads and chip paddle form a lead-frame (figure 2). The leads and the chip paddle are in a common plane (figure 8). The chip paddle can be in at least one part thicker than a portion of the leads forming the paddle and leads with an encapsulation-locking feature as taught by Glenn in figures 3-6. The lead-frame is adapted to receive a package body as shown in figure 8, wherein the chip, chip paddle, leads and bonding wires are encapsulated by a resin encapsulant (40). Also, as shown in figure 8, the chip paddle (24) and leads (53) are exposed along the bottom surface.

As to **claim 14**, the applicant recites etching of about 10% to about 90% of the lower side of the paddle. Glenn teaches etching as a means to form the roughened texture of the leads and the chip paddle (figures 3-5) that face the chip paddle in the completed package (column 5, lines 31-67, continued to column 6, lines 1 et seq.). Further, referring to figures 3 and 4, the surfaces of the leads and chip paddle appear to be almost fully etched. In figure 5, the surfaces of the leads and chip paddle appear to be about half etched (about 50%). For figures 3, 4 and 5, Glenn teaches the etched part to be inside the package body (figure 8 and column 5, lines 31-67, continued to column 6, lines 1 et seq.).

As to **claim 17**, Glenn teaches etching as a means to form the roughened texture of the leads and the chip paddle (figures 3-5) that face the chip paddle in the completed package (column 5, lines 31-67, continued to column 6, lines 1 et seq.).

As to **claim 18**, Glenn teaches exposure of the leads at side surfaces (figure 8, numeral 55) and bottom surfaces (32).

As to **independent claim 19**, Glenn teaches a lead-frame (figure 2, numeral 20) with a chip paddle (24) which is externally exposed in the package (see figure 8). A plurality of internal leads (53) are disposed around the chip paddle, wherein a lower surface of the leads is also exposed from the package (figure 8). Glenn teaches encapsulation of the lead-frame package, by applying an encapsulant to a surface of the lead-frame which would cover the chip, bonding wires, chip paddle and leads (figure 10, numeral 4). The fluid path, as taught by Glenn, is over the chip, chip paddle and leads so that they are covered by encapsulant. Glenn also teaches features of the leads and chip paddle which provide a locking feature for encapsulation (see figures 3-6).

As to **claim 20**, Glenn teaches etching as a means to form the roughened texture of the leads and the chip paddle (figures 3-5) that face the chip paddle in the completed package (column 5, lines 31-67, continued to column 6, lines 1 et seq.).

As to **claim 21**, the applicant recites etching of about 10% to about 90% of the lower side of the paddle. Glenn teaches etching as a means to form the roughened texture of the leads and the chip paddle (figures 3-5) that face the chip paddle in the completed package (column 5, lines 31-67, continued to column 6, lines 1 et seq.).

Further, referring to figures 3 and 4, the surfaces of the leads and chip paddle appear to be almost fully etched. In figure 5, the surfaces of the leads and chip paddle appear to be about half etched (about 50%).

As to **claim 22**, Glenn teaches etching as a means to form the roughened texture of the leads and the chip paddle (figures 3-5). The etching portion provides a means to lock the encapsulant to the chip paddle and leads (column 4, lines 36 et seq.).

As to **claim 23**, Glenn teaches etching as a means to form the roughened texture of the leads and the chip paddle (figures 3-5). The etching portion provides a reentrant portion for allowing the encapsulant to flow (column 4, lines 36 et seq.).

As to **claim 25**, Glenn teaches an etched portion (figures 3-5) of the chip paddle and leads which is inside the package body when encapsulated (figure 8), an upper surface of the chip paddle and lower surface of the leads in an approximate common plane (figure 8), the chip paddle (figure 8, numeral 24) bonded to a bottom surface of a chip (56), and a plurality of internal leads (figure 8, numeral 53) with an etched portion (again, see figures 3-5).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Glenn (6,143,981), as applied to claim 1 above, and further in view of Zimmerman (5,172,213).

As noted above, Glenn teaches a lead-frame and chip package.

Glenn does not specifically disclose a method of attaching the chip to the chip paddle of the lead-frame.

However, Zimmerman teaches a semiconductor chip mounted on a chip paddle with adhesive (column 3, lines 8-19).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the device of Glenn with an adhesive as taught by Zimmerman such that the chip is permanently bonded to the chip paddle. Even though the chip will be permanently attached to the chip paddle after encapsulation, wherein the encapsulant "marries" the chip paddle to the chip by covering the chip paddle and chip curing to form a hardened structure, it still would be advantageous to use an adhesive. An adhesive would ensure proper placement of the chip to the chip paddle such that the chip would not move from its proper alignment during attaching of bond wires, and flowing of encapsulant material. Further, in view of a manufacturing environment, it would also be advantageous to secure the chip to the chip paddle as the sealing step may be in a different location requiring transferring of the lead-frame package where the movement could jar the chip out of alignment were it not otherwise securely attached.

Response to Arguments

8. Applicant's arguments with respect to claims 1-7 and 13-25 have been considered but are moot in view of the new ground(s) of rejection.

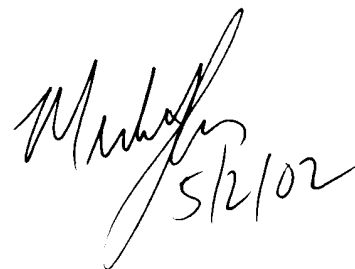
Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott Geyer whose telephone number is (703) 306-5866. The examiner can normally be reached on weekdays, between 10:00am - 6:30pm. The examiner may also be reached via e-mail: **scott.geyer@uspto.gov**

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Sherry can be reached on (703) 308-1680. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

sbg
April 23, 2002



MICHAEL SHERRY
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800